

WHAT IS CLAIMED IS:

1           1.       A method for recovering data contained in a signal, comprising:  
2           detecting a first group of pulses contained in said signal;  
3           producing one or more measurements for one or more parameters which  
4           characterize said first group of pulses; and  
5           determining an information symbol based on said one or more measurements.

1           2.       The method of claim 1 wherein said producing includes detecting a  
2           second group of pulses, at least one of said one or more parameters being based on said first  
3           and second groups of pulses.

1           3.       The method of claim 2 wherein said at least one of said one or more  
2           parameters is based on a timing relationship between said first and second groups of pulses.

1           4.       The method of claim 2 wherein said second group of pulses  
2           immediately follows said first group of pulses.

1           5.       The method of claim 1 wherein said detecting, producing, and  
2           determining are repeated to produce a plurality of information symbols.

1           6.       The method of claim 1 wherein said information symbol represents a  
2           binary value comprising one or more bits.

1           7.       The method of claim 1 wherein said one or more parameters includes  
2           parameters selected from the group consisting of: a group period ( $T_1$ ), a pulse width ( $T_2$ ), a  
3           pulse separation ( $T_3$ ), a silent period ( $T_4$ ), and number of pulses ( $N_p$ ).

1           8.       A method for recovering data from a signal, comprising:  
2           providing a set of information symbols;  
3           detecting plural groups of pulses; and  
4           for each group of pulses:  
5                 measuring one or more parameters which characterize said each group  
6           of pulses to produce one or more measurements corresponding to said each group of pulses;  
7           and  
8                 associating said each group of pulses with one of said information  
9           symbols based one or more of its corresponding one or more measurements.

1                   9.       The method of claim 8 wherein said measuring is based on two or  
2 more of said groups of pulses.

1                   10.       The method of claim 8 wherein each of said information symbols  
2 represents a binary number comprising one or more bits.

1                   11.       The method of claim 8 wherein said set of information symbols  
2 represents N-bit binary numbers, said set comprising  $2^N$  unique information symbols.

1                   12.       The method of claim 8 wherein said detecting includes receiving said  
2 signal and transforming said signal to produce said groups of pulses.

1                   13.       The method of claim 8 wherein said one or more parameters includes  
2 parameters selected from the group consisting of: a group period ( $T_1$ ), a pulse width ( $T_2$ ), a  
3 pulse separation ( $T_3$ ), a silent period ( $T_4$ ), and number of pulses ( $N_p$ ).

1                   14.       A method for producing data, comprising:  
2 receiving a signal;  
3 producing from said signal a plurality of groups of pulses, each group of  
4 pulses characterized by a set of parameters;  
5 detecting said groups of pulses in said signal; and  
6 mapping each of said groups of pulses to an information symbol based on one  
7 or more of said parameters of each of said groups of pulses.

1                   15.       The method of claim 14 wherein said mapping includes measuring one  
2 or more of said parameters for each of said groups of pulses.

1                   16.       The method of claim 14 wherein said mapping includes measuring at  
2 least two of said parameters for each of said groups of pulses, said mapping being based on  
3 said at least two parameters.

1                   17.       The method of claim 14 wherein said set of parameters includes: a  
2 group period ( $T_1$ ); a pulse width ( $T_2$ ); a pulse separation ( $T_3$ ); a silent period ( $T_4$ ); and a  
3 number of pulses ( $N_p$ ).

1                   18.       The method of claim 14 wherein said information symbol corresponds  
2 to a multi-bit datum.

1                   19.     The method of claim 14 wherein said information symbol corresponds  
2 to a one-bit datum.

1                   20.     The method of claim 14 wherein said detecting includes:  
2                   detecting a first set of groups of pulses and detecting a second set of groups of  
3 pulses, said first and second sets having at least one common group of pulses;  
4                   measuring one or more of said parameters of said common group based on  
5 groups of pulses in said first set to produce first measurements; and  
6                   measuring said one or more of said parameters of said common group based  
7 on groups of pulses in said second set to produce second measurements,  
8                   said mapping including mapping said common group to an information  
9 symbol based on said first and second measurements.

1                   21.     A method for recovering information from a signal, comprising:  
2                   (a) detecting a first set of groups of pulses contained in said signal;  
3                   (b) detecting a second set of groups of pulses contained in said signal;  
4                   (c) for each group of pulses in said first set, measuring one or more parameters  
5 to produce one or more first measurements corresponding to said each group of pulses in said  
6 first set;  
7                   (d) for each group of pulses in said second set, measuring one or more  
8 parameters to produce one or more second measurements corresponding to said each group of  
9 pulses in said second set; and  
10                  (e) for each group of pulses that is common to said first and second sets,  
11 producing an information symbol based on its first and second measurements.

1                   22.     The method of claim 21 further including in step (c) mapping one or  
2 more of said first measurements to a first candidate information symbol and in step (d)  
3 mapping one or more of said second measurements to a second candidate information  
4 symbol; wherein in step (e) said producing is based on said first and second candidate  
5 information symbols.

1                   23.     The method of claim 21 further including detecting additional sets of  
2 groups of pulses; producing additional one or more measurements for each additional set of  
3 groups of pulses; and producing said information symbol based on said first, second, and said

4 additional one or more measurements for each group of pulses that is common to each of said  
5 sets of groups of pulses.

1 24. The method of claim 21 wherein said parameters include: a group  
2 period ( $T_1$ ); a pulse width ( $T_2$ ); a pulse separation ( $T_3$ ); a silent period ( $T_4$ ); and a number of  
3 pulses ( $N_p$ ).

1 25. The method of claim 21 wherein said information symbol corresponds  
2 to a multi-bit datum.

1 26. The method of claim 21 wherein said information symbol corresponds  
2 to a one-bit datum.

1 27. A method for retrieving data contained in a signal comprising plural  
2 groups of pulses, comprising:  
3 launching at least two detection windows, each detection window being  
4 delayed relative to a first group of pulses;  
5 for each of said detection windows, determining a pulse count of pulses  
6 contained therein, to produce a first pulse count and a second pulse count; and  
7 identifying an information symbol based on said first and second pulse counts,  
8 thereby retrieving information from said pulses.

1 28. The method of claim 27 wherein said at least two pulse counts are  
2 different.

1 29. The method of claim 27 wherein said detection windows are launched  
2 one at a time.

1 30. The method of claim 27 wherein said detection windows have different  
2 delays.

1 31. The method of claim 27 wherein said identifying is a step of mapping  
2 the detection window having the higher of the two pulse counts to said information symbol.

1 32. A system for recovering data from a signal, said signal comprising a  
2 plurality of groups of pulses, the system comprising:  
3 detection means for detecting one of said groups of pulses;

4 measurement means, coupled to said detection means, for measuring one or  
5 more parameters which characterize said one of said groups of pulses; and  
6 symbol means, coupled to said measurement means, for mapping said one or  
7 more of said parameters to an information symbol.

1 33. The system of claim 32 wherein said one or more parameters includes  
2 parameters selected from the group consisting of: a group period ( $T_1$ ), a pulse width ( $T_2$ ), a  
3 pulse separation ( $T_3$ ), a silent period ( $T_4$ ), and number of pulses ( $N_p$ ).

1 34. The system of claim 32 wherein said one or more parameters is based  
2 on a timing relationship between said groups of pulses.

1 35. The system of claim 32 wherein said symbol means for mapping  
2 produces said information symbol based on at least two of said parameters.

1 36. The system of claim 32 wherein said measurement means includes:  
2 first and second pipelines, each having an input and an output, each configured  
3 to produce measurements for two or more groups of pulses, said second pipeline further  
4 configured to provide a delay of one group;  
5 a first delay unit coupled to said first pipeline output;  
6 a second delay unit coupled to said second pipeline output; and  
7 a decision component having an input, said first and second delay units  
8 coupled to said input,  
9 said first and second delay units configured to provide a delay during  
10 processing of said two or more groups of pulses.

1 37. The system of claim 36 wherein said first and second delay units each  
2 is configured to provide a variable delay, said variable delay depending on a group period of  
3 a group of pulses.

1 38. A circuit for recovering data contained in a signal, comprising:  
2 a first logic block having an input for receiving said signal and configured to  
3 detect a first group of pulses contained in said signal;  
4 a second logic block configured to produce measurement data indicative of  
5 one or more parameters which characterize said first group of pulses; and

6 a third logic block configured to determine an information symbol based on  
7 said one or more measurement data.

1 39. The circuit of claim 38 wherein said circuit is a field programmable  
2 gate array, said first, second, and third logic blocks being portions of said field programmable  
3 gate array.

1 40. The circuit of claim 38 wherein said circuit is an application specific  
2 integrated circuit.

1 41. The circuit of claim 38 wherein said second logic block includes logic  
2 circuits configured to detect a second group of pulses, at least one of said one or more  
3 parameters being based on said first and second groups of pulses.

1 42. The circuit of claim 38 wherein said third logic block is further  
2 configured to determine said information symbol based on measurement data for at least two  
3 of said parameters.

1 43. The circuit of claim 41 wherein said at least one of said one or more  
2 parameters is based on a timing relationship between said first and second groups of pulses.

1 44. The circuit of claim 41 wherein said second group of pulses  
2 immediately follows said first group of pulses.

1 45. The circuit of claim 38 wherein said information symbol represents a  
2 binary value comprising one or more bits.

1 46. The circuit of claim 38 wherein said one or more parameters includes  
2 parameters selected from the group consisting of: a group period ( $T_1$ ), a pulse width ( $T_2$ ), a  
3 pulse separation ( $T_3$ ), a silent period ( $T_4$ ), and number of pulses ( $N_p$ ).